

# Federation Management Technical Exchange

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# Agenda

- Purpose of Briefing
- Background on MOM Concept
- Review of Existing MOM elements
- Review of Service interactions
- Review of Proposed MOM enhancements

# Purpose of Briefing

- Review results of Federation Management Tech Exchange of 10/22/97
- That tech exchange reviewed an assessment of RTI-supplied MOM data for inclusion in HLA Interface Specification 1.3 and established priorities for retaining existing elements and including new elements
- Assumptions
  - Selected MOM data will become a required part of all RTIs
  - Federate provided MOM data was not considered
  - Implementation of MOM elements will be left to implementers
  - Decision whether to include in the Interface Spec will be based on
    - Priority (determined at the Tech Exchange)
    - Cost to implement (estimated by RTI implementation team)
    - Impact on RTI performance (estimated/prototyped by RTI team)
    - Appropriateness to RTI functionality
- NOTE: This briefing reflects the consensus recommendations of attendees at the technical exchange

# Background

## MOM Concept

- MOM provides a mechanism that allows a federate to monitor and control a federation
  - Uses the HLA paradigm
    - Management data is exchanged in the same way as other HLA data
    - Objects, attributes, and interactions are available for publishing and subscribing
  - Objects and attributes provide information that lets a federate
    - Monitor the health of the federation as a whole
    - Monitor the health and functioning of individual federates
  - Interactions provide controls that let a federate
    - Extract specific information to diagnose problems
    - Correct inconsistencies caused by software and network anomalies

# Background

## MOM Elements

- **manager.federate** object class
  - One object instance for each federate
  - Provided by the RTI <“publish” and “update”>
  - Contains
    - identifying information about federate
    - federate time state
    - RTI queue status for federate
- **manager.federation** object class
  - One object instance for federation
  - Provided by the RTI
  - Contains identifying information about federation

# Background

## MOM Elements (Cont'd)

- **manager.federate** interaction class
  - **Request** subclass interactions
    - Acted on by the RTI <“subscribed”>
    - Cause the RTI to generate `manager.federate.report` interactions that describe aspects of RTI state associated with a federate (e.g., which attributes the federate is publishing for which object instance).
  - **Adjust** subclass interactions
    - Acted on by the RTI <“subscribed”>
    - Adjust the way the RTI performs when responding to a federate (e.g., enabling logging of RTI activities)
  - **Report** subclass interactions
    - Produced by the RTI <“published” and “generated”>
    - Generate interactions that respond to request interactions.
  - **Service** subclass interactions
    - Acted on by the RTI <“subscribed”>
    - Invoke RTI services on behalf of another federate (e.g., change interaction transportation type).

# Criteria for Review MOM Elements

- Criteria were developed as a basis for judging whether
  - a current MOM feature should be retained, deleted, or changed
  - a proposed MOM feature should be included
- Criteria
  - **Present:** Data or action is already represented in the RTI
  - **Unique:** RTI is the only source of data or implementer of actions
  - **Needed:** Need for services is established by practical prototyping
  - **Fast:** Speed of RTI is not degraded by MOM activities
  - **Simple:** Complexity of RTI software is not increased
  - **Clear:** User products are not more difficult to understand
  - **Standard:** Data and actions adhere to HLA service definitions

# Review of Current MOM Elements

## manager.federate object attributes

|                      | MOM? | Present | Unique | Needed | Fast | Simple | Clear | Standard |
|----------------------|------|---------|--------|--------|------|--------|-------|----------|
| Federate host        | YES  | ✓       | NO[1]  | ✓      | ✓    | ✓      | ✓     | ✓        |
| Federate state       | YES  | ✓       | ✓      | ✓      | ✓    | ✓      | ✓     | ✓        |
| Federate name        | YES  | ✓       | NO[1]  | ✓      | ✓    | ✓      | ✓     | ✓        |
| RTI version          | YES  | ✓       | ✓      | ✓      | ✓    | ✓      | ✓     | ✓        |
| Time manager state   | YES  | ✓       | ✓      | ✓      | ✓    | ✓      | ✓     | ✓        |
| Federate lookahead   | YES  | ✓       | ✓      | ✓      | ✓    | ✓      | ✓     | ✓        |
| Federate time        | YES  | ✓       | ✓      | ✓      | ✓    | ✓      | ✓     | ✓        |
| Time constrained     | YES  | ✓       | ✓      | ✓      | ✓    | ✓      | ✓     | ✓        |
| Time regulating      | YES  | ✓       | ✓      | ✓      | ✓    | ✓      | ✓     | ✓        |
| Dequeue FIFO async   | YES  | ✓       | ✓      | ???    | ✓    | ✓      | NO    | ✓        |
| FIFO length          | YES  | ✓       | ✓      | ✓      | ✓    | ✓      | ✓     | ✓        |
| TSO length           | YES  | ✓       | ✓      | ✓      | ✓    | ✓      | ✓     | ✓        |
| Total object count   | YES  | ✓       | ✓      | ✓      | ✓    | ✓      | ✓     | ✓        |
| Holding tokens count | NO   | ✓       | ✓      | ???    | ✓    | ✓      | NO    | ✓        |
| Deleted object count | NO   | ✓       | ✓      | ???    | ✓    | ✓      | NO    | ✓        |
| Number of attributes | NO   | ✓       | ✓      | NO     | ✓    | ✓      | NO    | ✓        |
| Number of parameters | NO   | ✓       | ✓      | NO     | ✓    | ✓      | NO    | ✓        |

[1] While federate host and federate name are not uniquely available from the RTI, including them in the object adds convenience for little cost.



# Review of Current MOM Elements

## manager.federation object attributes

|                         | <b>MOM?</b> | <b>Present</b> | <b>Unique</b> | <b>Needed</b> | <b>Fast</b> | <b>Simple</b> | <b>Clear</b> | <b>Standard</b> |
|-------------------------|-------------|----------------|---------------|---------------|-------------|---------------|--------------|-----------------|
| Federation name         | YES         | ✓              | NO            | ✓             | ✓           | ✓             | ✓            | ✓               |
| Federation state        | YES         | ✓              | ✓             | ✓             | ✓           | ✓             | ✓            | ✓               |
| Federates in federation | YES         | ✓              | ✓             | ✓             | ✓           | ✓             | ✓            | ✓               |
| Save is scheduled       | YES         | ✓              | ✓             | ✓             | ✓           | ✓             | ✓            | ✓               |
| Scheduled save time     | YES         | ✓              | ✓             | ✓             | ✓           | ✓             | ✓            | ✓               |
| RTI version             | YES         | ✓              | ✓             | ✓             | ✓           | ✓             | ✓            | ✓               |

# Review of Current MOM Elements

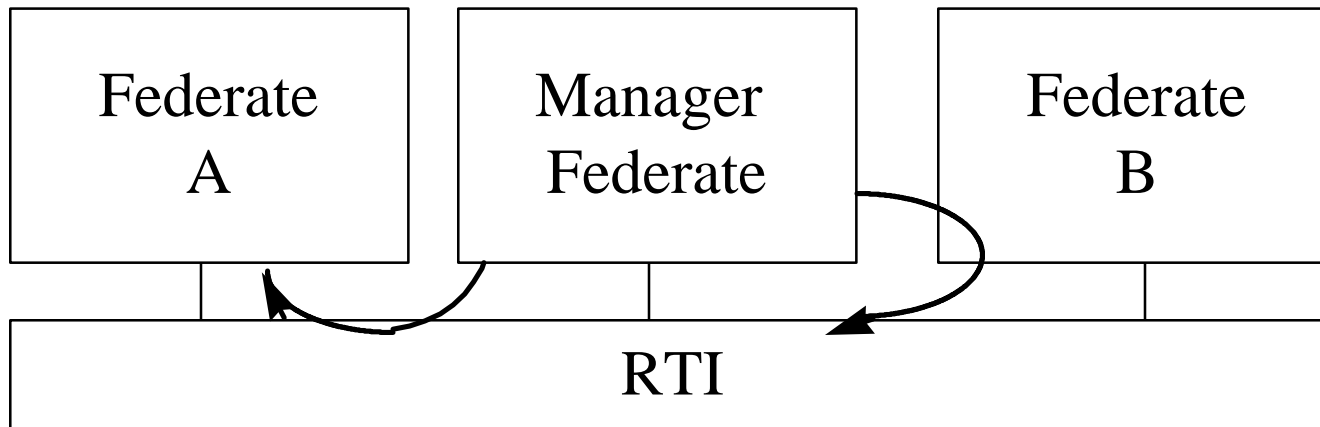
## manager.federate interactions

|                  | MOM? | Present | Unique | Needed | Fast | Simple | Clear | Standard |
|------------------|------|---------|--------|--------|------|--------|-------|----------|
| Request subclass | YES  | ✓       | ✓      | ✓      | ✓    | ✓      | ✓     | ✓        |
| Adjust subclass  | YES  | ✓       | ✓      | ✓      | ✓    | ✓      | ✓     | ✓        |
| Report subclass  | YES  | ✓       | ✓      | ✓      | ✓    | ✓      | ✓     | ✓        |
| Service subclass | YES  | ✓       | ✓      | ✓      | ✓    | ✓      | ✓     | ✓        |

- Subclass organization is new but interactions contained in them are not.
- Service subclass interactions invoke RTI services on behalf of another federate (e.g., change interaction transportation type). Additional study is needed to determine which services should be included in the service subclass.

# Review of Service Interactions

- These interactions provide a manager federate with the ability to invoke RTI services on behalf of another federate
  - Manager federate causes the RTI to invoke a callback to Federate A.
  - Manager federate causes the RTI to react as if a service was invoked by Federate B.



# Review of Service Interactions

- All fit most of the criteria
  - **Present:** Data or action is already represented in the RTI
  - **Unique:** RTI is the only source of data or implementer of actions
  - **Fast:** Speed of RTI is not degraded by MOM activities
  - **Simple:** Complexity of RTI software is not increased
  - **Clear:** User products are not more difficult to understand
  - **Standard:** Data and actions adhere to HLA service definitions
- We must determine whether they fit the other
  - **Needed:** Need for services is established by practical prototyping
- Priorities 1-4 will be included in Interface Specification 1.3.
- In the service listings on the following slides
  - † indicates a callback from the RTI to the federate
  - \* indicates that the service interaction is implemented in RTI v1.0

# Review of Service Interactions

## Federation Management

| <b>Service</b>                  | <b>Recommended Priority</b>   |
|---------------------------------|-------------------------------|
| • Create Federation Execution   | 9 - direct service available  |
| • Destroy Federation Execution  | 9 - direct service available  |
| • Join Federation Execution     | 9 - remote join not permitted |
| • Resign Federation Execution * | 1 - management control        |
| • Request Pause                 | 9 - direct service available  |
| • Initiate Pause †              | 3 - for anomaly correction    |
| • Pause Achieved                | 3 - for anomaly correction    |
| • Request Resume                | 9 - direct service available  |
| • Initiate Resume †             | 3 - for anomaly correction    |
| • Resume Achieved               | 3 - for anomaly correction    |

# Review of Service Interactions

## Federation Management (Cont'd)

| <b>Service</b>               | <b>Recommended Priority</b>  |
|------------------------------|------------------------------|
| • Request Federation Save    | 9 - direct service available |
| • Initiate Federate Save †   | 3 - for anomaly correction   |
| • Federate Save Begun        | 3 - for anomaly correction   |
| • Federate Save Achieved     | 3 - for anomaly correction   |
| • Federate Save Not Achieved | 3 - for anomaly correction   |
| • Request Restore            | 9 - direct service available |
| • Initiate Restore †         | 3 - for anomaly correction   |
| • Restore Achieved           | 3 - for anomaly correction   |
| • Restore Not Achieved       | 3 - for anomaly correction   |

# Review Service Interactions

## Declaration Management

| Service                                  | Recommended Priority      |
|--|---------------------------|
| • Publish Object Class                   | 1 - federation management |
| • Unpublish Object Class                 | 1 - federation management |
| • Publish Interaction Class              | 1 - federation management |
| • Unpublish Interaction Class            | 1 - federation management |
| • Subscribe Object Class Attributes      | 1 - federation management |
| • Unsubscribe Object Class               | 1 - federation management |
| • Subscribe Interaction Class            | 1 - federation management |
| • Unsubscribe Interaction Class          | 1 - federation management |
| • Turn Updates On For Object Class †     | 7 -                       |
| • Turn Updates Off For Object Class †    | 7 -                       |
| • Turn Interactions On †                 | 7 -                       |
| • Turn Interactions Off †                | 7 -                       |
| • Turn Updates On For Object Instance †  | 7 -                       |
| • Turn Updates Off For Object Instance † | 7 -                       |

These services are advisory to the federate, so may have no effect on federation execution. Also, implementing these services as service interactions may cause RTI consistency difficulties

# Review of Service Interactions

## Object Management

| Service  | Recommended Priority       |
|--|----------------------------|
| • Register Object  | 7 - Note [1]               |
| • Discover Object †  | 7 - Note [1]               |
| • Update Attribute Values  | 7 - Note [1]               |
| • Reflect Attribute Values †   | 7 - Note [1]               |
| • Send Interaction   | 7 - Note [2]               |
| • Receive Interaction †  | 7 - Note [2]               |
| • Delete Object *  | 3 - for anomaly correction |
| • Remove Object †  | 7 - Note [1]               |
| [1] These services can be accomplished by assuming ownership of an object and performing the updates directly. |                            |
| [2] These services can be accomplished by sending the interaction directly.                                    |                            |



# Review of Service Interactions

## Object Management

| Service                                  | Recommended Priority         |
|--|------------------------------|
| • Change Attribute Transportation Type   | 1 - federation management    |
| • Change Attribute Order Type            | 1 - federation management    |
| • Change Interaction Transportation Type | 1 - federation management    |
| • Change Interaction Order Type          | 1 - federation management    |
| • Attributes In Scope †                  | 5 - for anomaly correction   |
| • Attributes Out Of Scope †              | 5 - for anomaly correction   |
| • Interaction In Scope †                 | 5 - for anomaly correction   |
| • Interaction Out Of Scope †             | 5 - for anomaly correction   |
| • Request Attribute Value Update         | 9 - direct service available |
| • Request Class Attribute Value Update   | 9 - direct service available |
| • Provide Attribute Value Update †       | 5 - for anomaly correction   |
| • Retract                                | 8 - for anomaly correction   |
| • Reflect Retraction †                   | 8 - for anomaly correction   |

# Review of Service Interactions

## Ownership Management

| <b>Service</b>                                   | <b>Recommended Priority</b>   |
|--|-------------------------------|
| • Request Attribute Ownership Divestiture        | 1 - federation management     |
| • Request Attribute Ownership Assumption †       | 5 - for anomaly correction    |
| • Attribute Ownership Divestiture Notification † | 5 - for anomaly correction    |
| • Attribute Ownership Acquisition Notification † | 5 - for anomaly correction    |
| • Request Attribute Ownership Acquisition        | 5 - for anomaly correction    |
| • Request Attribute Ownership Release †          | 5 - for anomaly correction    |
| • Query Attribute Ownership                      | 9 - other mechanism available |
| • Inform Attribute Ownership †                   | 9 - other mechanism available |
| • Is Attribute Owned By Federate                 | 9 - other mechanism available |

# Review of Service Interactions

## Time Management

| Service                          | Recommendation             |
|----------------------------------|----------------------------|
| • Enable Time Regulation *       | 1 - federation management  |
| • Time Regulation Enabled †      | 6 - for anomaly correction |
| • Disable Time Regulation *      | 1 - federation management  |
| • Enable Time Constrained *      | 1 - federation management  |
| • Time Constrained Enabled †     | 6 - for anomaly correction |
| • Disable Time Constrained *     | 1 - federation management  |
| • Change Lookahead *             | 1 - federation management  |
| • Time Advance Request           | 5 - federation management  |
| • Time Advance Request Available | 5 - federation management  |
| • Next Event Request             | 5 - federation management  |
| • Next Event Request Available   | 5 - federation management  |
| • Flush Queue Request            | 5 - federation management  |
| • Time Advance Grant †           | 3 - anomaly correction [1] |

[1] The RTI should determine the time value for this service, not an interaction parameter.

# Review of Service Interactions

## Data Distribution Management

| Service  | Recommended Priority     |
|--|--------------------------|
| • Create Region                                    | 6 - Note [1]             |
| • Modify Region                                    | 6 - Note [1]             |
| • Delete Region                                    | 6 - Note [1]             |
| • Register Object With Region                      | 6 - Note [1]             |
| • Associate Region For Updates                     | 6 - Note [1]             |
| • Unassociate Region For Updates                   | 6 - Note [1]             |
| • Subscribe Object Class Attributes With Region    | 6 - Note [1]             |
| • Unsubscribe Object Class Attributes With Region  | 6 - Note [1]             |
| • Subscribe Interaction Class With Region          | 6 - Note [1]             |
| • Unsubscribe Interaction Class With Region        | 6 - Note [1]             |
| • Send Interaction With Region                     | 6 - Note [1]             |
| • Request Class Attribute Value Update With Region | 9 - other mech available |
| • Change Thresholds †                              | 6 - Note [1]             |

[1] These services are needed but initial underlying implementation is in progress.

# Proposed MOM Enhancements

## Methodology

- Each proposal contains
  - **Value:** Management value that this enhancement implements
  - **Description:** description of the proposed enhancement
  - **Implementation:**
    - Recommended method of implementing the enhancement.
    - Account for frequency of need (periodic or infrequent)
    - Account for breadth of need (all federates or just one)
  - **Priority:** recommended priority (1=high, 1-4 included in IF Spec 1.3)
  - **Discussion:** Reasons for recommended priority
- Sources examined
  - Federation Management Tool      Compliance Testing
  - STOW DEM      Logica FOM Reader tool
  - ALSP CMT      MOM Specification v0.2

# Proposed MOM Enhancements

## Min Next Event Time

- **Value:** Visibility into federate state
- **Description:** Make public the minimum time of the next event available to a federate (minimum of the LBTS and the head of the TSO queue)
- **Implementation:**
  - new attribute of object `class manager.federate`
- **Priority:** 3
- **Discussion:** None.

# Proposed MOM Enhancements

## LBTS

- **Value:** Visibility into federate state
- **Description:** Make public the LBTS of a federate
- **Implementation:**
  - new attribute of object `class manager.federate`
- **Priority:** 3
- **Discussion:** None.

# Proposed MOM Enhancements

## Federation Time

- **Value:** Visibility into federation state
- **Description:** Make public the federation time
- **Implementation:**
  - new attribute of object `class manager.federation`
- **Priority:** 3
- **Discussion:** None.



# Proposed MOM Enhancements

## FED File Name

- **Value:** Visibility into parameters driving the federation
- **Description:** Make public the name of the FED file used by a federate
- **Implementation:**
  - new attribute of object `class manager.federate`
- **Priority:** 5
- **Discussion:** FED manipulation is implementation-dependent. For example, some implementations don't maintain FED data in a file.

# Proposed MOM Enhancements

## Received Update Counts

- **Value:** Measure of the health of the federation.
- **Description:** Make public the cumulative number of updates (by class and transportation type) received by a federate.
- **Implementation:**
  - new interaction of class `manager.federate.report`
  - parameters of vectors containing object class/quantity pairs
  - send in response to a new interaction of class `manager.federate.request`
- **Priority:** 4
- **Discussion:** Expressed user need. Prototyped in the FMT.

# Proposed MOM Enhancements

## Received Interaction Counts

- **Value:** Measure of the health of the federation.
- **Description:** Make public the cumulative number of interactions (by class and transportation type) received by a federate.
- **Implementation:**
  - new interaction of class `manager.federate.report`
  - parameters of vectors containing interaction class/quantity pairs
  - send in response to a new interaction of class `manager.federate.request`
- **Priority:** 4
- **Discussion:** Expressed user need. Prototyped in the FMT.

# Proposed MOM Enhancements

## Sent Update Counts

- **Value:** Measure of the health of the federation.
- **Description:** Make public the cumulative number of updates (by class and transportation type) sent by a federate.
- **Implementation:**
  - new interaction of class `manager.federate.report`
  - parameters of vectors containing and object class/quantity pairs
  - send in response to a new interaction of class `manager.federate.request`
- **Priority:** 4
- **Discussion:** Expressed user need. Prototyped in the FMT.

# Proposed MOM Enhancements

## Sent Interaction Counts

- **Value:** Measure of the health of the federation.
- **Description:** Make public the cumulative number of interactions (by class and transportation type) sent by a federate.
- **Implementation:**
  - new interaction of class `manager.federate.report`
  - parameters of vectors containing interaction class/quantity pairs
  - send in response to a new interaction of class `manager.federate.request`
- **Priority:** 4
- **Discussion:** Expressed user need. Prototyped in the FMT.

# Proposed MOM Enhancements

## Owned Object Counts

- **Value:** Insight into object creation state of a federate
- **Description:** Make public the number of objects (by class) whose privilege to delete attribute is owned by a federate.
- **Implementation:**
  - new interaction of class `manager.federate.report`
  - parameter of vector containing object class/quantity pairs
  - send in response to a new interaction of class `manager.federate.request`
- **Priority:** 3
- **Discussion:** Expressed user need. Prototyped in the FMT.

# Proposed MOM Enhancements

## Updated Object Counts

- **Value:** Insight into object updating state of a federate
- **Description:** Make public the number of objects (by class) of which at least one attribute is being updated by a federate.
- **Implementation:**
  - new interaction of class `manager.federate.report`
  - parameter of vector containing object class/quantity pairs
  - send in response to a new interaction of class `manager.federate.request`
- **Priority:** 3
- **Discussion:** Expressed user need.

# Proposed MOM Enhancements

## Reflected Object Counts

- **Value:** Insight into object reflecting state of a federate
- **Description:** Make public the number of objects (by class) of which at least one attribute is being reflected by a federate.
- **Implementation:**
  - new interaction of class `manager.federate.report`
  - parameter of vector containing object class/quantity pairs
  - send in response to a new interaction of class `manager.federate.request`
- **Priority:** 3
- **Discussion:** Expressed user need. Prototyped in the FMT.



# Proposed MOM Enhancements

## Subscription Data

- **Value:** Insight into subscription state of a federate
- **Description:** Make public a federate's subscription settings for object classes and attributes and interactions.
- **Implementation:**
  - new interaction of class `manager.federate.report`
  - send in response to a new interaction of class `manager.federate.request`
- **Priority:** 1
- **Discussion:** This service is already implemented in RTI 1.0.

# Proposed MOM Enhancements

## Publishing Data

- **Value:** Insight into publishing state of a federate
- **Description:** Make public a federate's subscription settings for object classes and attributes and interactions.
- **Implementation:**
  - new interaction of class `manager.federate.report`
  - send in response to a new interaction of class `manager.federate.request`
- **Priority:** 1
- **Discussion:** This service is already implemented in RTI 1.0.

# Proposed MOM Enhancements

## Network Topology

- **Value:** Visibility into the network topology used by the federation.
- **Description:** Make public the topology of the federation.
- **Implementation:**
  - new attribute of object class `manager.federate`
  - indicates which LAN a federate belongs to
- **Priority:** 7
- **Discussion:** This information is useful but all proposed implementations are implementation-specific.

# Proposed MOM Enhancements

## Latency

- **Value:** Insight into the health of the federation and the underlying network
- **Description:** Make public the latency duration (time from when a federate invoked a service until it is ready to be received by another federate).
- **Implementation:**
  - new interaction of class `manager.federate.report`
  - vector containing federate/latency-from-federate pairs
  - send in response to a new interaction of class `manager.federate.request`
- **Priority:** 9
- **Discussion:** This service is outside the purview of the RTI.

# Proposed MOM Enhancements

## Recency

- **Value:** Insight into the health of a federate.
- **Description:** Make public the wall clock time of the last time that the federate interacted with the RTI.
- **Implementation:**
  - new attribute of object class `manager.federate`
  - vector containing federate/last-time-heard-from-federate pairs
  - report periodically with period set by interaction `manager.federate.adjust.SetTiming`
- **Priority:** 9
- **Discussion:** This service is outside the purview of the RTI.

# Proposed MOM Enhancements

## Save Automation

- **Value:** Automation of RTI functions
- **Description:** Permit a federate to set an interval for federation saves.
- **Implementation:**
  - None. The timing interval can be built into a federate and implemented using existing MOM/RTI mechanisms
- **Priority:** 9
- **Discussion:** None

# Proposed MOM Enhancements

## Buffer Space

- **Value:** Insight into the health of the RTI
- **Description:** Make public the percent of buffer space that is available in the RTI for a federate.
- **Implementation:**
  - new attribute of object class `manager.federate`
  - report periodically with period set by interaction `manager.federate.adjust.SetTiming`
- **Priority:** 9
- **Discussion:** While this information would be useful, no appropriate metric could be found.

# Proposed MOM Enhancements

## Computer Workload

- **Value:** Insight into the health of the federate and RTI
- **Description:** Make public the percent of the available computer workload that is being used.
- **Implementation:**
  - new interaction of class `manager.federate.report`
  - send in response to a new interaction of class `manager.federate.request`
- **Priority:** 9
- **Discussion:** This service is outside the purview of the RTI.



# Proposed MOM Enhancements

## Logical Workload

- **Value:** Insight into the health and workload of a federate.
- **Description:** For logical time federates, make public the percent of time that the federate is processing (vice waiting for time advance from the RTI).
- **Implementation:**
  - new interaction of class `manager.federate.report`
  - send in response to a new interaction of class `manager.federate.request`
- **Priority:** 7
- **Discussion:** This service is outside the purview of the RTI.

# Proposed MOM Enhancements

## Save Data

- **Value:** Insight into federation state
- **Description:** Make public the name and time of the last implemented Federation save and the next scheduled Federation save.
- **Implementation:**
  - new attributes of object class `manager.federation`
  - Federation time of the next save is already an attribute
  - Maintain past save data (currently, only future save data is maintained)
- **Priority:** 3
- **Discussion:** None

# Proposed MOM Enhancements

## Game Ratio

- **Value:** Insight into federation health
- **Description:** Make public sufficient data that a federate can calculate game ratio (logical time duration / wall clock duration).
- **Implementation:**
  - Add wall clock time as a new attribute of object class `manager.federate`
  - report periodically with period set by interaction `manager.federate.adjust.SetTiming`
- **Priority:** 9
- **Discussion:** This service is outside the purview of the RTI.

# Proposed MOM Enhancements

## Transport-specific data

- **Value:** Insight into the health of the federation and its underlying network
- **Description:** Make public data that is specific to an implementation of the RTI (e.g., bundling effectiveness, bundling size, multicast groups, counts by transportation method (best effort, minimum rate, state consistent, reliable)).
- **Implementation:**
  - new interaction of class `manager.federate.report`
  - send in response to a new interaction of class `manager.federate.request`
- **Priority:** 7
- **Discussion:** Implementation-specific data is inappropriate for the RTI. However, transportation type should be included as a parameter of send data counts.

# Proposed MOM Enhancements

## Ping

- **Value:** Insight into the presence and health of federates.
- **Description:** Permit a federate to initiate a “ping” which would be acknowledged by addressee(s).
- **Implementation:**
  - new interaction of class `manager.federate.request`
  - causes a response in a new interaction of class `manager.federate.report`
- **Priority:** 9
- **Discussion:** This service can be accomplished currently using HLA mechanisms.

# References

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- Specht, SA, “Federation Management Tool Development for the ALSP-HLA Transition”, *Minutes of the Fall 1997 Simulation Interoperability Workshop*, Orlando FL.
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